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2,504,079

METHOD OF MAKING SLIDE FASTENERS

Original Filed Feb. 26, 1945

2 Sheets-Sheet 1

Fig. 1.

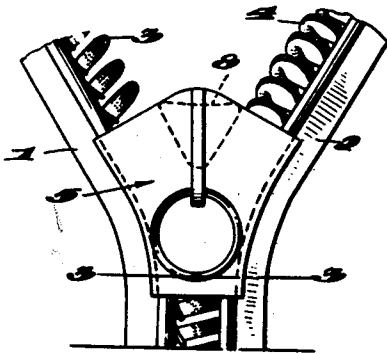


Fig. 2.

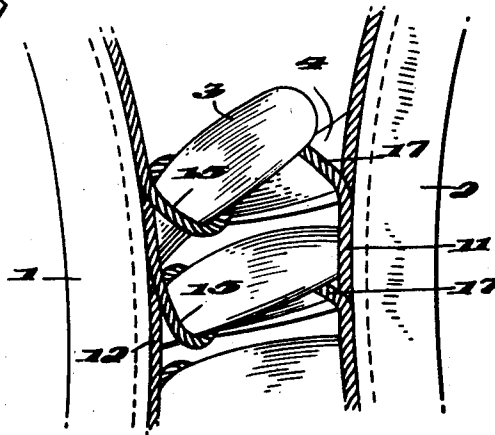


Fig. 3.

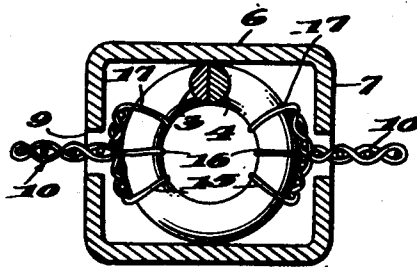
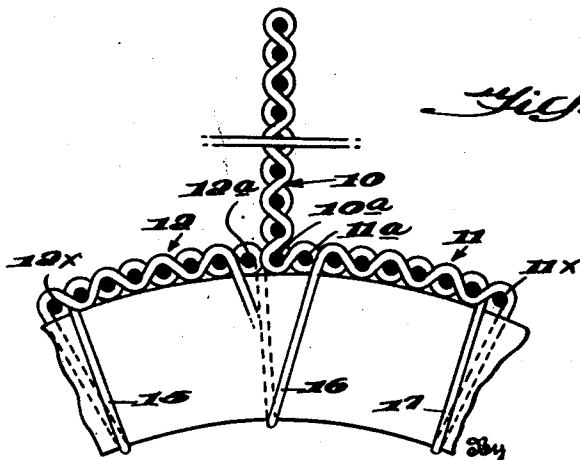


Fig. 4.



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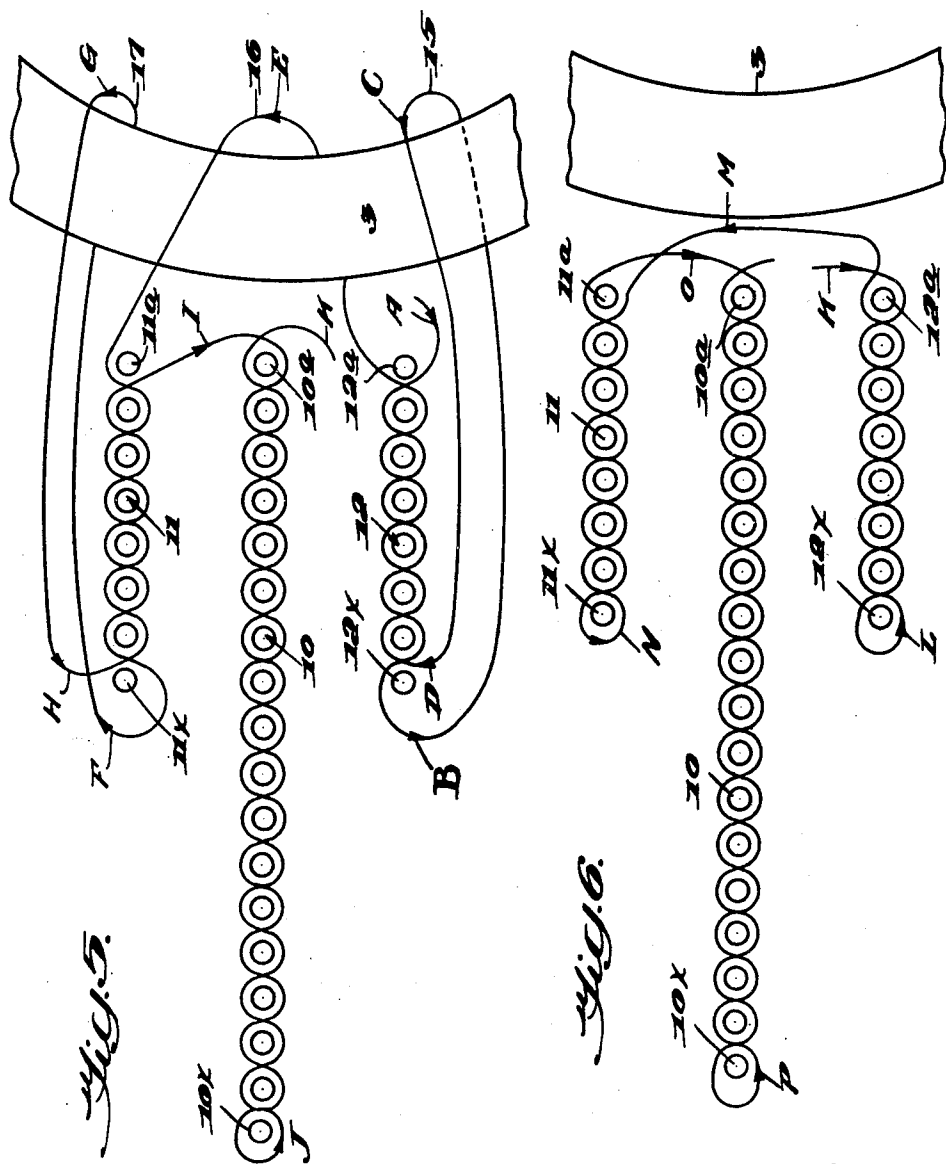
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METHOD OF MAKING SLIDE FASTENERS

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2 Sheets-Sheet 2



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METHOD OF MAKING SLIDE FASTENERS

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579,746. Divided and this application Septem-
ber 18, 1946, Serial No. 697,728

4 Claims. (Cl. 139—384)

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The present invention relates to slide fasteners of the type comprising a pair of interlocking coils capable of being interlocked and disengaged by the action of a slider movable longitudinally thereon, and aims generally to provide improved means for securing the slider coils to their respective attaching tapes or stringers.

Slide fasteners of the interlocking coil type, in general, comprise a pair of co-mating, oppositely wound, open helical coils of metal or any of a wide variety of organic plastic materials, each coil being attached to a tape or stringer. Each coil should be so securely attached to its stringer that the lengthwise spacing between successive turns is slightly less than the major dimension of the stock of the coil in order that the intermediate portions of each coil may be squeezed between corresponding portions of the other coil. It is also important from the standpoint of ease in operation of the slider that each coil be securely attached along an edge of its stringer so as to prevent twisting of the coil on the stringer, and so as to maintain the axis of the coil in proper alignment with the plane of the stringer.

Furthermore, in slide fasteners of the interlocking coil type there is danger of disengaging the slider from the coil. This is particularly true when the slider is operated quickly to close the coils and one of the coils happens to be bent angularly, presenting a spacing between certain convolutions of a coil in substantial alignment with the marginal side flanges of the slider.

The present invention aims to improve generally the construction of slide fasteners of the interlocking coil type so as to overcome the above-stated disadvantages.

One of the objects of the present invention is the provision of an improved construction of coil type slide fastener wherein the slider is prevented from being disengaged from the coil.

Another object of the invention is the provision of an improved construction of stringer tape and coil wherein the tape is woven to and securely connected to the coil.

A further object of the invention is the provision of an improved construction of stringer tape and coil in which the coil is attached to the tape by a weft thread of the tape looped a plurality of times about each convolution of the coil to properly secure the coil to the tape.

Another object of the invention is to improve the construction of tape and associated coil as to produce a neater, less conspicuous and hence more attractive slide fastener.

A further object of the invention is to provide a novel type and construction of coil-carrying stringer tapes.

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A still further object of the invention resides in the improvement of the method of making the stringer tapes as well as for attaching the tapes to the coils.

The above and other objects of the invention will be apparent to those persons skilled in the art from a consideration of the accompanying drawings and annexed specification illustrating and describing one preferred construction embodying the invention as well as a preferred method of manufacture thereof.

This application is a division of my co-pending application Serial No. 579,746, filed February 26, 1945.

In the drawings:

Fig. 1 is a fragmental front elevation of a portion of a coil type slide fastener according to one embodiment of the invention;

Fig. 2 is an enlarged detail front elevation of a portion of a pair of interlocking coils and attached stringer tapes according to a preferred form of the invention;

Fig. 3 is an enlarged transverse sectional view of the slide fastener shown in Fig. 1, as taken on the line 3—3 thereof;

Fig. 4 is a greatly enlarged horizontal sectional view taken transversely through the stringer tape and illustrating the manner of attaching the stringer tape to a coil; and

Figs. 5 and 6 are schematic views illustrating the method of weaving the stringer tape to the coil according to one form of the invention.

Slide fasteners of the type in which the fastener elements comprise a pair of co-mating interlocking coils are well known. The coils are usually formed of continuous lengths of a ribbon or filament of suitable material, such as metal or plastic. These filaments or ribbons are usually of non-circular cross section and are helically wound while twisting to provide a coil of desired length, the convolutions of which are spaced apart, a distance less than the thickness of the stock.

As stated, the coils may be made of metal or of any of a wide variety of organic plastic materials, for example solid polymers of styrene, vinyl chloride, vinylidene chloride or methyl methacrylate et cetera or resinous copolymers of such compounds with other unsaturated organic compounds. Such organic plastics are preferred since they may readily be colored and the filaments are sufficiently stiff and elastic to retain their shape after being formed, but are sufficiently flexible so that they may be easily bent without breaking.

Referring to the drawings, the fastener of the present invention comprises a pair of stringer

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tapes 1—2, each having attached thereto one of a pair of co-mating interlocking fastener coils 3—4 of suitable construction. The coils are provided with a slider 5 which may be of conventional form provided with plates or sides 6, each having marginal side flanges 7 and connected near their upper ends by a neck or edge 8 which cooperates with the marginal side flanges to form a substantially Y-shaped coil-receiving channel. The inner free edges 9 of the marginal side flanges 7 are disposed on opposite sides of the stringer tapes 1 and 2 and are spaced from the tapes so as not to unduly wear the tapes as the slider is moved longitudinally back and forth thereon.

It has heretofore been proposed, as a means of preventing accidental disengagement of the slider from one or both of the coils, to provide the tape with large diameter continuous beads on one or both sides of the tape. This construction is satisfactory from the standpoint of providing a continuous guide for the slider, but it increases the width of the fastening and the slider to the point where the fastening is less attractive in appearance.

According to my invention, the tape is of woven construction embodying a web portion 10 and one or more flange or wing portions 11 and 12 along one edge of the web and to which the successive convolutions of the coil are attached. The web and flanges of the stringer tape may be of substantially uniform thickness and the flanges may be of such width as to provide a retaining guide for the slider which may be of the usual minimum width. Additionally, the use of relatively wide flanges on the stringer tape provides a cover for the side edges of the coils so that only an intermediate part of the coil is exposed to view when the fastener is closed, thus enhancing the appearance of the fastening.

In the illustrated embodiment of the invention each of the stringer tapes 1 and 2 comprises a web 10 and edge wings or flanges 11 and 12 formed of woven fabric material and including warp threads and a weft thread. The warp threads conveniently are of uniform size though this is not essential to the invention and the flange warp threads may be of different size or diameter from the web warp threads if desired. The web 10 with the edge wings or flanges 11—12 form a stringer tape of T-shaped cross section which is preferable though a tape L-shaped in cross section may be employed where a slider guide on only one side of the tape is desired or deemed necessary.

The fastener coils 3—4 may be of any suitable shape and construction and as herein illustrated they comprise helical circular windings of a filament non-circular in cross section, the filament being twisted 180 degrees in each winding or convolution. The coils 3—4 are co-mating and may be interlocked together by the movement of the slider as will be understood. Each coil 3 and 4 is connected to an edge of a stringer tape 1 or 2 and preferably to the flanges or wings 11—12. The particular construction of the stringer tapes and of the manner in which they are woven to the coils will be best understood from Figs. 5 and 6, depicting one method of making the tapes.

Referring to Figs. 5 and 6, the warp threads are illustrated in parallel groups of web warp threads and wing or flange warp threads, it being understood that these warp threads are appropriately separated by the loom heddle to permit the passage of the shuttle. For convenience the endmost threads of the group of web warp

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threads are designated 10^a—10^x, the endmost threads of the group forming the wing 11, as 11^a—11^x, and the endmost threads of the group forming the wing 12, as 12^a—12^x. It will also be understood that a preformed coil 3 or 4 is fed to the loom adjacent the warp threads and in the path of the shuttle.

In the particular stringer tape illustrated in Figs. 5 and 6 there are eighteen (18) warp threads in the web 10 within the group between 10^a and 10^x and eight (8) warp threads in each of the wings or flanges 11—12, within the group designated between 11^a—11^x and 12^a—12^x, and for a particular weave selected there are sixteen (16) picks of the shuttle for each coil convolution of the fastener coil. It is to be understood, however, that the above is not critical and is merely illustrative, as obviously the number of warp threads as well as the number of picks and hence the number of weft threads per convolution of the coil may be varied considerably. In Figs. 5 and 6 the weft thread of the stringer tape is illustrated as a single line and the designating arrows thereon indicate the course and pick number of the shuttle. The cycle of weaving for any single convolution of the coil is as follows:

At the start of the cycle the shuttle moves from right to left, alternately between the warp threads of the flange or wing 12 between the warp thread 12^a and the next adjacent thread of the wing 12 as indicated by the arrow designated A (Fig. 5). The weft thread is carried by the shuttle over and around the endmost warp thread 12^x of the wing 12 and the shuttle then makes the second pick, indicated by the arrow B (Fig. 5). The second pick B is an idle pick, i. e. the wing or flange is not woven, and the shuttle passes under the coil 3, which momentarily may be raised above the path of the shuttle. The coil is then lowered, permitting the shuttle to pass over the coil on its third pick, indicated by the arrow C. This third pick is also an idle pick, the purpose of picks B and C being to loop the weft thread around the coil as at 15 and draw the outermost warp thread 12^x of the wing tightly against the coil, as shown in Fig. 4. The fourth pick D is a weaving pick alternating between warp threads of the wing 12, the shuttle passing, at the end of this pick, between adjoining warp threads 10^a of the web 10 and 12^a of the wing 12 and under the coil which again has been temporarily raised. On the fifth pick, designated E, the shuttle moves over the coil and makes a weaving pick around the warp thread 11^a and alternately between the warp threads of the wing 11, thus binding the coil to the web 10 by loop 16.

The sixth pick, designated F, is an idle pick above the warp threads of wing 11 and under the coil which again has been momentarily raised. The seventh pick, designated G, to the left, loops the coil as at 17 and is an idle pick to draw the end warp thread 11^x of wing 11 tightly against the coil 3. The eighth pick designated H, to the right, is a weaving pick, the shuttle passing alternately between the warp threads of wings 11.

The above described manner of weaving the stringer tapes and of attaching them to the coils materially improves the construction of the fastener, as the multiple point attachment of the stringer to each convolution of the coil materially strengthens the fastener structure and holds the coil in proper alignment with the web of the stringer, as illustrated in Fig. 4.

After the weft threads have been attached to

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a coil convolution, as above described, it is necessary to weave a certain amount of web and wings preparatory to binding or looping the next adjacent coil convolution. The number of picks of the shuttle will, of course, be determined by the texture of the woven stringer tape, the pitch of the coil and the spacing to be allowed between each coil convolution. Preferably the coils are attached to the stringer such that the spacing between coil convolutions is less than the major cross sectional dimension of the coil stock or filament. It is obviously desirable that the coil convolutions be uniformly spaced and accordingly this spacing is uniformly regulated by a predetermined amount of weaving or number of picks, prior to the next cycle of picks for the succeeding coil convolution.

In the illustrated example I have provided eight weaving picks of the shuttle between the weaving pick H of the wing 11, following the last looping 17 of a coil and the first pick for the cycle of the next succeeding coil convolution. These are illustrated by picks designated I, J (Fig. 5) and picks K, L, M, N, O and P (Fig. 6).

This may be effected by weaving back and forth across the web picks I and J (Fig. 5), then weaving back and forth across each of the two wings picks K, L, M and N (Fig. 6), and then back and forth across the web picks O and P (Fig. 6). During this weaving the coil need not be raised or lowered as the weft thread is not looped around the coil. It will be apparent to those skilled in the art that the numbers of weaving picks I to P will vary depending upon the size of the coil and the size of the weft threads, as are necessary to uniformly space the coil convolutions lengthwise of the tapes 1 and 2 a distance slightly less than the maximum cross sectional dimension of the coil filament.

As is illustrated in Figs. 2 and 3, the provision of stringers having a web and at least one lateral wing along an edge thereof, provided a continuous guide along the coil for the slider, whose marginal side flanges are outwardly of and enclose the guides. The combined thickness of the stringer web 10 and width of the wing 11 or 12 should be greater than the spacing between free edges 8 of opposed flanges 7 on opposite sides of the web. These continuous flanges or wings 11 and 12 prevent the slider 5 from becoming accidentally disengaged from the coil as it is impossible for the marginal side flanges 7 to be passed through the spacing between any two adjacent coil convolutions.

A further advantage of the construction is that the stringer wings or flanges are secured at their edges to the coil and cover the edge portions of the coils, exposing to view in front elevation a minimum amount of fastener coil substantially less than the diameter of the coil, thus enhancing the appearance of the fastener.

It is to be understood that the invention is not restricted to the particular construction and steps of the method shown and described, as the scope of the invention is best stated in the appended claims.

I claim:

1. The method of making a coil attached stringer tape for slide fasteners in which the successive convolutions of the coil are woven to the tape in uniform spaced relationship, which method comprises presenting a preformed

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fastener coil adjacent to the warp threads designed to form a tape, selectively interweaving a weft thread with said warp threads and periodically looping the weft thread around a convolution of said coil in spaced relation thereon, thereafter interweaving the weft thread with the warp threads independently of the coil through a predetermined distance, and again selectively interweaving the weft thread with the warp threads and periodically looping the weft thread around a succeeding coil convolution to uniformly space said coil convolutions and secure them to the tape as it is woven.

2. The method of making a coil attached stringer tape for slide fasteners which tape has a web portion and a laterally extending wing portion along one edge of the web portion which comprises presenting a preformed fastener coil adjacent to a plurality of warp threads designed to form the web and wing portions, selectively interweaving the warp threads of the web and wing portions with a weft thread, and looping the weft thread around each convolution of the coil at opposite ends of the wing portion to securely attach the coil convolutions to the tape as it is woven.

3. The method of making a coil attached stringer tape having a web portion and laterally extending wing portions and in which the successive convolutions of the coil are woven to the tape in uniform spaced relation which comprises presenting a preformed fastener coil adjacent the warp threads designed to form the web and wing portions, selectively interweaving the warp threads of the web and wings with a weft thread, and periodically looping the weft thread around each convolution of the coil at a plurality of spaced points along the circumference thereof from the end warp threads of the wings to securely attach the coil convolutions to the tape as it is woven.

4. The method of making a coil attached stringer tape having a web portion and laterally extending wing portions and in which the successive convolutions of the coil are woven to the tape in uniform spaced relation which comprises presenting a preformed fastener coil adjacent the warp threads designed to form the web and wing portions, interweaving a weft thread with the warp threads of a wing in one direction, looping the weft thread around a convolution of the coil, interweaving the weft thread with the warp threads of the wing in the opposite direction, again looping the weft thread around a convolution of the coil, interweaving the weft thread with the warp threads of the other wing in one direction, again looping the weft thread around a convolution of the coil, and then interweaving the weft thread with the warp threads of the other wing in the opposite direction and successively with the warp threads of the web.

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